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# Surveillance for Methicillin-resistant *Staphylococcus aureus* in Battambang, Cambodia

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## Abstract

Methicillin-resistant *Staphylococcus aureus* (MRSA) and humanitarian missions are increasing worldwide. The prevalence of MRSA in the populations served may be unknown. A BRAVA (Blast Resuscitation and Victim Assistance) mission was conducted at Battambang, Cambodia that included microbiology support. No MRSA was detected in our patients despite the reported increase in MRSA in Asia. Continued investigation is warranted for future missions.

## Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) was first recognized in 1961<sup>1</sup> and first reported in the United States in 1968.<sup>2</sup> Since then, the number and proportion of MRSA isolates has been steadily increasing and is an issue worldwide. Knowledge of the prevalence of MRSA in developing countries is limited. As humanitarian missions continue, the epidemiology of these organisms becomes paramount for mission planning and pre-deployment medication purchases.

In February, 2001, the United States Army, Pacific participated in a Blast Resuscitation and Victim Assistance (BRAVA) mission at the non-governmental organization medical facility Emergency (Life Support for Civilian War Victims) in Battambang, Cambodia. The first of two teams was composed of two general surgeons, one orthopedic surgeon, one anesthesiologist, one operating room nurse, one infectious disease physician, one microbiologist, and one administrator.

The composition of this team was unique and provided an opportunity to provide assistance outside the operating theater. Knowledge of the hospital's antibiogram prior to deployment did not exist and reported clinical samples were small in number. Therefore, a portion of the mission funds was designated to enhance laboratory capabilities and improve microbiology assets. A performance improvement project with surveillance cultures was therefore undertaken to determine if MRSA was present in this small hospital.

## Methods

Emergency is a non-governmental organization (Italian) facility that primarily provides surgical care for war and blast victims. The hospital operates two operating suites and three large inpatient wards of approximately 60 beds (one intensive care unit and two patient wards).

Two groups of patients had one time surveillance cultures obtained. Group 1 consisted of patients with any form of break in the skin (open wound, fistula, pin site etc.). A culture swab (Baxter Culturette System, Baxter Healthcare Corp., Deerfield, IL) was placed in contact with the open area and submitted for culture. No skin preparation or cleaning was performed prior to sampling. Within six hours, specimens were inoculated onto 5% sheep blood agar (Remel, Lenexa, Kansas). Bacterial cultures were incubated at 35°C for 24 hours in ambient air.

Morphologically distinct colonies were tested for coagulase and protein A using Staphaurex (Becton Dickinson Diagnostic Systems, Sparks, MD). *Staphylococcus aureus* isolates were tested for growth on MRSA Screen Agar (Hardy Diagnostic, Santa Maria, CA). Group 2 was composed of patients without skin breaks. Anterior nares sampling was performed in Group 2 using one culture swab per patient. Identical culture techniques were followed with these samples for the identification of MRSA.

## Results

Group 1 was comprised of 15 patients on the inpatient ward service and Group 2 consisted of 36 patients also on the inpatient wards. Table 1 shows the culture results. Four patients (28%) in Group 1 and five patients (14%) in Group 2 had positive cultures for *Staphylococcus aureus*. None of the strains were identified as MRSA. Sensitivity testing was not possible at the local laboratory. During the week period of time that cultures were possible, there were no post-operative wound infections or acute infections.

The four patients in Group 1 with *S. aureus* wound colonization had;

- 1) blast de-gloving injury to hand,
- 2) open left below knee amputation,
- 3) open right femur wound, and
- 4) septic arthritis with fistula as their primary diagnoses.

Group 1 patient results also demonstrated various streptococci, *Pseudomonas* and *Klebsiella* species (data not shown). Sensitivity testing was not available for these pathogens at the time.

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Table 1.— Culture Results

	Group 1	Group2
	n (%)	n(%)
Samples	14	36
Staphylococcus aureus	4(28)	5(14)
MRSA	0	0

## Discussion

The importance of MRSA worldwide is increasing. Strains of MRSA are still sensitive to vancomycin with rare exceptions to date. However, vancomycin is only effective for MRSA infections in the intravenous form. As such, the cost and limitations of administration are increased over other oral antimicrobial agents. Sensitivity testing, when available can be used to find alternative regimens for infections and in some cases trimethoprim/sulfamethoxazole, clindamycin, tetracycline and erythromycin can be used for therapy. None of these agents however can be relied upon in the absence of testing.

As humanitarian missions increase in underserved locations, knowledge of antimicrobial sensitivity will be important for planning purposes. Prior to our arrival, specimens for culture and sensitivity were sent to a reference laboratory in Phnom Penh. Because of the increased cost required, the number of available results was limited. Antimicrobial agent availability was likewise limited by cost and availability. During our mission preparation, contact with the hospital director revealed the lack of a database documenting antimicrobial susceptibility patterns. This limited knowledge created difficulty in pre-deployment purchasing. It is important to ensure that the right medications reach the hospitals and only the medications necessary are purchased.

During the early part of the mission, we consulted the surgical staff regarding the incidence of staphylococcal infections and the antimicrobial susceptibility profiles. The staff was not aware of any MRSA issues, but did note that penicillin was only used on admission for prophylaxis and wound infections were treated with ceftriaxone due to its availability and relative activity against staphylococci. We were afforded the opportunity to visit with the provincial minister of health. He reported no evidence of MRSA in the area, but penicillin-resistant staphylococci were the norm (verbal communication).

Southeast Asia has not been spared the worldwide spread of resistant staphylococci. Rohani and others reported that 40% of *S. aureus* isolates from three hospitals in Malaysia were methicillin-resistant.<sup>3</sup> From a pure geographic point of view, data from Thailand might provide some insight into the prevalence of MRSA in Cambodia. As with other parts of the world, the proportion of MRSA isolates has also been increasing in Thailand.<sup>4</sup> Between 1988 and 1998, the proportion of MRSA isolates from the three regions rose to about 30%.<sup>4</sup> In contrast, only 5% of staphylococcal isolates were resistant to oxacillin in Saigon, South Vietnam.<sup>5</sup>

Given this information, there is good reason to be concerned that Cambodia is also affected to some degree. Despite this, we were

fortunate not to have identified any MRSA isolates. We are well aware that our surveillance was conducted with only two sampling periods and consisted of a small number of patients. The community rate of MRSA in Battambang is unknown. It is not clear whether our limited experience has identified a naïve location or merely represents sampling error. Repeat evaluation in the region is certainly warranted.

Humanitarian missions should continue to strive for information regarding antimicrobial susceptibility profiles among the most common bacterial pathogens. This information is critical to mission planning and may subsequently reduce costs by limiting the amount and type of antibiotics necessary for a particular mission. Given the additional costs required to implement infection control policies in MRSA endemic areas, knowledge of their presence would further impact mission planning. We hope that this kind of surveillance will interest other mission planners in including laboratory support and surveillance in future missions.

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